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## **Case 1: A 16-year-old female with left lower-quadrant abdominal pain**

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## Case 1: A 16-year-old female with left lower-quadrant abdominal pain

A previously healthy 16-year-old female presented to the emergency department with a four-day history of vomiting, diarrhea and left lower-quadrant abdominal pain. Clinically, the patient exhibited signs of abdominal distention, with a fluid shift suggestive of ascites. Bowel sounds were diminished, her leukocyte count was elevated and radiographs of the abdomen showed dilated small-bowel loops compatible with a bowel obstruction. An ultrasound showed a large volume of peritoneal fluid without a visualized appendix. An urgent computed tomography scan suggested small-bowel obstruction.

The patient underwent an exploratory laparoscopy, which revealed a large volume of purulent fluid in the pelvis, right and left lower colic gutters, as well as above the liver. The small bowel was tethered together with interloop abscesses. The small bowel was examined twice, distally to proximally, with no evidence of adhesive bowel obstruction. The appendix appeared normal. The uterus, fallopian tubes and ovaries all appeared inflamed but no tubo-ovarian abscess was present. The abdomen was irrigated copiously with 4 L of saline.

Postoperatively, the patient was started on ampicillin, gentamicin and metronidazole. The preliminary blood culture identified Gram-positive clusters, and the antibiotics were switched to meropenem and vancomycin while awaiting identification of the organism.

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### CASE 1 DIAGNOSIS: PRIMARY PERITONITIS

The bacteria in the peritoneal culture was identified as *Streptococcus pyogenes*. The patient was discharged from hospital on postoperative day 4 on oral doxycycline and metronidazole, and her symptoms had resolved by the seven-day follow-up. Primary peritonitis is a rare entity that should be considered in children presenting with an acute abdomen with ascites. One of the first descriptions of primary peritonitis, published in 1975, was a review of 84,352 paediatric admissions (zero to 14 years of age) in Cleveland, Ohio, over a 10-year period, which revealed 26 patients with primary peritonitis (1). Ten additional case series involving previously healthy children have been published over the past 40 years, describing a total of 60 patients (2-12). In adults, <50 cases have been reported in the literature (13-16).

The typical paediatric patient is female (in 75% to 100% of cases [2,17]) and four to nine years of age (2,11). A review of the adult literature suggested that females comprise approximately 80% of cases, with age ranging from 17 to 87 years; the majority of patients are between 20 and 39 years of age (13-16). The prevalence in previously healthy children is difficult to ascertain, although previous reviews suggest that primary peritonitis represents 1% to 2% of all paediatric abdominal emergencies (1,8,11,18). The most frequently identified pathogens are *Streptococcus pneumoniae*, *S pyogenes* or *Staphylococcus aureus* (18) in children, and *S pneumoniae*, *S pyogenes* and *Neisseria meningitidis* in adults (14). Twelve of the cumulative total of 60 reported patients with primary peritonitis had group A streptococcus (GAS) isolated in cultures.

GAS, or *S pyogenes*, can manifest clinically in a multitude of ways, from benign conditions, such as impetigo and acute pharyngitis, to more systemic conditions such as acute rheumatic fever or necrotizing fasciitis. Primary peritonitis caused by GAS is less commonly considered in a previously healthy patient because primary peritonitis is usually associated with other conditions such as chronic liver disease, ascites, nephrotic syndrome or immunosuppression (19). The most common presenting features in a previously healthy paediatric patient with primary peritonitis are a rapidly rising temperature, vomiting and diarrhea, and a sudden progression of diffuse abdominal pain and distension (2-3). These findings typically occur within the first 48 h of the illness, which is shorter than in our case. Laboratory findings suggestive of the diagnosis are nonspecific (eg, leukocytosis [2] or elevation of acute phase reactants [16]). Blood cultures are positive for a Gram-positive pathogen in one-half of patients, and one-third of individuals have a sterile peritoneal culture (12), which can make the diagnosis of peritonitis challenging.

The pathophysiology of GAS peritonitis is not well understood, and a source of infection is not always identified. Diagnosis requires a high index of suspicion (1,2). In the context of no pre-existing ascites or comorbid conditions, possible sources that have been proposed include pharynx, pulmonary sources and ascending infection from the genital tract (13). The predilection for the female host may suggest ascension from the female genital tract as the predominant source of the infection, enabling hematogenous spread to the peritoneum (17). GAS can be found in the female genital tract but is not the predominant bacteria (13). In prepubertal girls, this predilection may be caused by alkaline vaginal secretions that may be less inhibitory to bacterial growth than the acidic secretions of postpubertal females (20). In postpubertal women, a history of sexual activity, intrauterine device or previous delivery have been implicated as risk factors for the development of primary peritonitis (16,17). It is often very challenging to isolate the original source of the GAS because vaginal or throat cultures are often negative (13,16). Although

experience is limited, the mainstay of treatment consists of laparotomy to establish the diagnosis and treatment, with surgical exploration of the abdominal cavity and extensive washout (13,16). Antibiotic courses ranging from five to 14 days have been proposed, although the optimal duration is unknown (20).

### CLINICAL PEARLS

- Primary GAS peritonitis is a rare entity in children that should be included in the differential diagnosis of an acute abdomen.
- Missing a diagnosis of primary peritonitis can lead to complications such as septic shock and potentially long-term reproductive issues in women.
- Early diagnosis and treatment with surgical washout of the abdominal cavity and antibiotics may predispose to a favourable outcome.

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